

airship's own resources. Sitting on the sea there is plenty of hydrogen in the water around, if some reasonably light electrolytic process can be found. Perhaps some system of cracking oil may meet our requirements, but it is a point that requires the earnest consideration of every aeronautical who wishes to see the empire linked up by real commercial aircraft at the earliest possible date.

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### DISCUSSION.

SIR CHARLES BRIGHT :—Commander Boothby gives out so much useful information in a very modest way, that I do not think there is any fear of our overdoing our expression of gratitude. I propose a very hearty vote of thanks to Commander Boothby for his interesting paper.

The vote of thanks was seconded by Mr. Molesworth and passed with acclamation, and the discussion then proceeded.

COMMANDER HUNSAKER :—I should like to express my appreciation of what Commander Boothby has done in taking us back through 18 years of historical development, and also projecting us about 16 years ahead. If the next 16 years are as fruitful as the past 18, airships should become a very useful part of our civilisation.

CAPTAIN SAYERS :—I think it is an extremely good sign that the Institution of Aeronautical Engineers, whose members are mostly concerned with aeroplanes, should every now and then be stirred up to the recollection of the fact that there have been such things as airships in the past, and are likely to be more in the future.

I have had nothing to do with airships, and my main interest is in aeroplanes, but at the same time I do not know how anyone with any reasonable understanding of the characteristics of the two can imagine for a moment that the aeroplane is going to supersede the airship, or the airship the aeroplane. The essential difference between the two is, that for a given speed the weight per h.p. of the aeroplane is constant, and that the bigger you make the aeroplane, the less the proportion of your useful load becomes; whereas, with an airship, the bigger it is the less h.p. you require per ton for a given speed. That means that if you want to carry large loads over a long distance you can do it by the use of the big airship, but if you want to carry a really large load on an aeroplane you find you cannot do so. It therefore comes out

that for high-speed work on comparatively short distances the aeroplane has nothing to fear from the airship, while for long distances and heavy load-carrying, the airship has nothing to fear from the aeroplane.

There are a few points of competition. For low speeds the airship will beat the aeroplane so long as sufficient traffic can be secured. At about 100 m.p.h. on moderate distances there may be some competition.

It seems to me that the airship has one very great advantage which may enable it to compete with the aeroplane in cases where at first sight it would look impossible. An aeroplane service is running fairly regularly between London and Paris now, and gets from Croydon to Le Bourget in  $2\frac{1}{2}$  hours, but Croydon is not London nor Le Bourget Paris. The airship should be able to pick up passengers at say the Nelson column and land them at the Eiffel Tower.

There are many engineering problems to be solved in connection with airships, and Commander Boothby has pointed out in a very clear way the general physical possibilities of dealing with them. I would suggest that the actual practical problems are worth considerable study, and I am sure there is a long time to come before the aeronautical engineer has successfully tackled all the problems of airship design.

LIEUT. OLECHNOVITCH :—Just before the war the question of airships was being carefully considered in Russia, and after one airship of French design had completed a successful winter journey in Russia it was decided that large airships could be employed for commercial purposes with advantage. There is, however, the question of insurance, and if that is likely to be costly, an airship scheme could not be taken up in Russia. I should be pleased if the lecturer could give me any information on the matter.

COMMANDER BOOTHBY :—Replying to the last speaker, the airship is being seriously considered in some quarters for use in mining, transport of mining machinery, etc. One company in Nigeria are considering taking their machinery up by air, and thus commencing work two years sooner than they could otherwise do. I got competitive designs for this purpose, and the result was quite successful, the Parseval being the type chosen. Another design—a British one—was not quite so good.

These and other heavy-load problems could be well solved by the use of airships, and I am convinced that it would be a paying proposition. An airship can go right over a ship in harbour, moor to her masthead, and take away heavy loads direct out of the hold and then fly them to their destination. I look forward to great airship developments in Russia, because it is a country of long distances, and it will take a considerable time to develop railways, whilst airship services for mails and passengers could be quickly established.

With regard to insurance. Lloyds laid by a definite sum to be lost on insurance of aircraft, in order that they might learn what to charge. We

can take it that tested airships of approved type (such as R. 33 and 34, and Parseval) can be insured reasonably—say, 10 per cent.; new, untested types will come higher till they have passed their trials. I approached the Air Ministry and suggested that they should try to organise airship insurance as the Government did in connection with the submarine campaign during the war. Then the Government insured ships at a certain rate, leaving the insurance companies to quote any lower rate they liked. The companies soon got the rate down, and if the Government now will quote about 10 per cent. for airships, the insurance companies should come down to 9 per cent. very soon.

There is no reason why a properly designed and equipped airship using heavy oil and gas armour should not come under the usual rates for shipping insurance in the near future, when the crews of commercial airships are as competent as those of the Mercantile Marine.

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Hearty votes of thanks to Commander Boothby for his interesting lecture, and to Sir Charles Bright for so kindly taking the Chair, were proposed by Mr. Molesworth and seconded by Captain Sayers, and passed with acclamation. The meeting then closed.

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